

Exploring the roles of storage technologies in the Spanish electricity system with high share of renewable energy

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Abstract-

At operational level, fossil fuel phase-out and high shares of non-dispatchable Energy Storage Systems (ESSs) in this context, the need for a long time scope to capture the different RES variabilities must be reconciled with the need for modeling the hourly chronology. This paper presents a medium-term operation planning model, addressing both the energy dispatch and the balancing services. This study shows that representing the combined chronological variability of demand and RES production is essential to properly assess the roles of different kinds of ESSs in the future 2030 electricity mix. Otherwise, it would not be possible to appropriately capture the frequency, depth, and length of events for which ESSs are activated. The analysis also highlights the importance of considering balancing services, given the significant contribution of batteries to the reserve market. Finally, the results show that batteries and Pumped

Index Terms- Renewables; Electricity; Critical events; Hydropower; Operation planning; Storage

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